United States Patent [19]

Ali et al.

[54] **DISTRIBUTED STORAGE MANAGEMENT SYSTEM HAVING A CACHE SERVER AND METHOD THEREFOR**

[75] Inventors: **Seifu Ali**, Santa Clara, Calif.; **Thomas G. Burket**, Potomac, Md.; **Tawel Hu**, San Jose, Calif.; **Gerald Edward Kozina**, Cupertino, Calif.; **Thomas S. Lee**, San Jose, Calif.

[73] Assignee: **International Business Machines Corporation**, Armonk, N.Y.

[21] Appl. No.: **08/656,441**

[22] Filed: **May 31, 1996**

[51] Int. Cl.⁶ G06F 13/38; G06F 15/17

[52] U.S. Cl. **395/200.43**; 395/200.46

[58] Field of Search 707/1, 10, 9, 200,
707/2; 395/200.31, 200.49, 200.38, 200.46,
200.43; 711/138, 130

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[57] **ABSTRACT**

The present invention is directed to a method and system for storing and managing objects, such as binary large objects (blobs) in a digital library system which includes a plurality of clients, an object server for storing an object, a cache server for storing a copy of the object, and a centralized server for storing information identifying the object as being stored in the object server and associating one or more of the clients with the cache server, in which one of the clients, as a requesting client, requests retrieval of an object, a copy of the requested object is sent from the cache server to the requesting client if the object is stored in said cache server, and a copy of said object is sent from the object server to said requesting client if the object is not stored in the cache server; and a copy of the requested object is sent from the object server to the cache server after the object server sends the object to the client, in which the object sent to the client is made available to the client regardless of whether sending of the copy of the object to the cache server is completed.

18 Claims, 8 Drawing Sheets
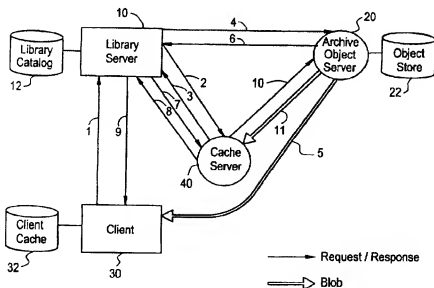
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.M./

[54] PROCESS FOR OPTIMIZING THE EFFECTIVENESS OF A HYPERTEXT ELEMENT

[75] Inventors: George R. Garrick, Chicago; Scott D. Weaver, Deerfield, both of Ill.

[73] Assignee: Net. Rol, Chicago, Ill.

[21] Appl. No.: 08/787,532

[22] Filed: Jan. 21, 1997

[51] Int. Cl.⁶ G06F 13/00

[52] U.S. Cl. 709/224; 709/219; 707/501; 707/513

[58] Field of Search 709/203, 219, 709/207, 231, 224, 217, 218; 705/10; 395/200.54; 707/501, 513

[56] References Cited

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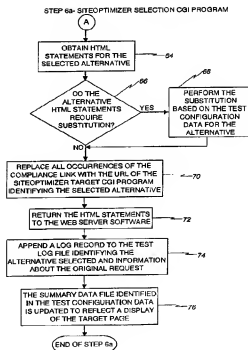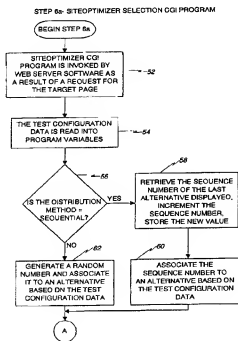
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Ari Luotonen et al., World–Web Proxies, CERN, Apr. 1994, pp. 1–8, W3C, http://www.w3.org/.

Primary Examiner—Zarni Maung
Assistant Examiner—Patrice L. Winder

[57] ABSTRACT

A process for optimizing the effectiveness of a web site analyzes various hypertext variables of hypertext documents formed from Hyper Text Mark-up Language (HTML) to identify weak links in order to improve compliance with the business objective for the web site. A plurality of alternate hypertext documents are created and placed in parallel paths relative to the original hypertext document according to a predetermined distribution pattern which may be sequential, equal distribution or random distribution, for example. Accesses to the web site are redirected to the alternative hypertext elements transparently. Access logs for each of the alternative hypertext documents are analyzed to determine the most effective alternative hypertext document, according to a predetermined criteria. The most effective hypertext element is then substituted for the original hypertext element in order to improve the effectiveness of the web site.

8 Claims, 22 Drawing Sheets

STEP 6a- SITEOPTIMIZER SELECTION CGI PROGRAM

BEGIN STEP 6a

SITEOPTIMIZER CGI PROGRAM IS INVOKED BY WEB SERVER SOFTWARE AS A RESULT OF A REQUEST FOR THE TARGET PAGE — 52

THE TEST CONFIGURATION DATA IS READ INTO PROGRAM VARIABLES — 54

IS THE DISTRIBUTION METHOD = SEQUENTIAL? — 56

YES → RETRIEVE THE SEQUENCE NUMBER OF THE LAST ALTERNATIVE DISPLAYED, INCREMENT THE SEQUENCE NUMBER, STORE THE NEW VALUE — 58

NO — 62 → GENERATE A RANDOM NUMBER AND ASSOCIATE IT TO AN ALTERNATIVE BASED ON THE TEST CONFIGURATION DATA

60 ASSOCIATE THE SEQUENCE NUMBER TO AN ALTERNATIVE BASED ON THE TEST CONFIGURATION DATA

A

STEP 6a- SITEOPTIMIZER SELECTION CGI PROGRAM

A

OBTAIN HTML STATEMENTS FOR THE SELECTED ALTERNATIVE — 64

DO THE ALTERNATIVE HTML STATEMENTS REQUIRE SUBSTITUTION? — 66

YES → PERFORM THE SUBSTITUTION BASED ON THE TEST CONFIGURATION DATA FOR THE ALTERNATIVE — 68

NO

REPLACE ALL OCCURRENCES OF THE COMPLIANCE LINK WITH THE URL OF THE SITEOPTIMIZER TARGET CGI PROGRAM IDENTIFYING THE SELECTED ALTERNATIVE — 70

RETURN THE HTML STATEMENTS TO THE WEB SERVER SOFTWARE — 72

APPEND A LOG RECORD TO THE TEST LOG FILE IDENTIFYING THE ALTERNATIVE SELECTED AND INFORMATION ABOUT THE ORIGINAL REQUEST — 74

THE SUMMARY DATA FILE IDENTIFIED IN THE TEST CONFIGURATION DATA IS UPDATED TO REFLECT A DISPLAY OF THE TARGET PAGE — 76

END OF STEP 6a

United States Patent [19]

Sidana

[11] **Patent Number:** **6,081,829**

[45] **Date of Patent:** *Jun. 27, 2000

[54] **GENERAL PURPOSE WEB ANNOTATIONS WITHOUT MODIFYING BROWSER**

[75] Inventor: **Ashmeet S. Sidana**, Mountain View, Calif.

[73] Assignee: **Silicon Graphics, Inc.**, Mountain View, Calif.

[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

[21] Appl. No.: **08/594,873**

[22] Filed: **Jan. 31, 1996**

[51] Int. Cl.[7] **G06F 15/16**

[52] U.S. Cl. **709/203**, 707/512

[58] Field of Search 395/200.15, 200.03, 395/200.18, 200.31, 200.33, 200.76; 707/512

[56] **References Cited**

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(List continued on next page.)

Primary Examiner—Mehmet B. Geckil
Attorney, Agent, or Firm—Graham & James LLP

[57] **ABSTRACT**

A general purpose system and method for associating annotations, modifications, or other information with a web-viewable document is disclosed. An embodiment of the system and method includes the use of a "redirector." A user attempting to access a document at a particular web address, sends a request to view the document to that address. The request is intercepted by the redirector which, in turn, requests the document on behalf of the user. The redirector modifies the document and returns the modified document for viewing by the user. The modifications may include, for example, various comments or annotations to the original web-viewable document. According to the invention, such customized documents may be presented to the user without modification of commercially available browser and/or server software.

25 Claims, 11 Drawing Sheets

(12) United States Patent
Jawahar et al.

(10) Patent No.: US 6,298,356 B1
(45) Date of Patent: Oct. 2, 2001

(54) **METHODS AND APPARATUS FOR ENABLING DYNAMIC RESOURCE COLLABORATION**

(75) Inventors: **Janardhanan Jawahar**, San Jose; **Venkatachari Dilip**, Cupertino, both of CA (US)

(73) Assignee: **Aspect Communications Corp.**, San Jose, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 09/197,011

(22) Filed: Nov. 20, 1998

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/008,523, filed on Jan. 16, 1998, now abandoned.

(51) Int. Cl.^{7} G06F 17/30
(52) U.S. Cl. 707/201; 707/10; 707/513; 707/2; 711/113; 709/203
(58) Field of Search 707/201, 202, 707/2, 10, 513; 709/204, 203; 711/113

(56) **References Cited**

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(57) **ABSTRACT**

Methods and apparatus for enabling collaboration with web pages and other resources is described. A method includes the step of establishing a collaboration session between a first client and a second client. A requested resource is cached with the session host in response to a request having a first uniform resource locator (URL) issued by the first client, if the requested resource is a pre-determined type of resource. A second URL is provided to the second client. The second URL identifies the requested resource or the cached resource in accordance with whether the requested resource is cached. Apparatus for enabling collaboration includes a web server, a cache, and a filter. The web server provides a requested web page in response to a first client's request. The filter stores the requested web page in the cache, if the requested web page is a pre-determined type of web page. A number of pre-determined characteristics for caching are described in various embodiments of the methods and apparatus. In one embodiment, the requested resource is cached if it is a dynamic web page. In one embodiment an expiration date of the requested resource determines whether the requested resource should be cached. In another embodiment, a filename associated with the requested resource determines whether the requested resource should be cached. In another embodiment, components of the request determine whether the requested web page should be cached.

27 Claims, 16 Drawing Sheets

(12) **United States Patent**
    Cohen et al.

(10) **Patent No.:** US 6,330,561 B1
(45) **Date of Patent:** Dec. 11, 2001

(54) **METHOD AND APPARATUS FOR IMPROVING END TO END PERFORMANCE OF A DATA NETWORK**

(75) Inventors: **Edith Cohen**, Berkeley Heights, NJ (US); **Balachander Krishnamurthy**, New York City, NY (US); **Jennifer Lynn Rexford**, Summit, NJ (US)

(73) Assignee: **AT&T Corp.**, New York, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/105,018**

(22) Filed: **Jun. 26, 1998**

(51) Int. Cl.[7] G06F 17/30
(52) U.S. Cl. 707/10; 707/2; 707/104
(58) Field of Search 707/101, 103, 707/10, 2, 104; 709/203, 228, 219, 247, 217, 202, 226, 223, 231, 200; 455/4.2; 711/122; 713/201

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Assistant Examiner—Thuy Pardo
(74) *Attorney, Agent, or Firm*—Kenyon & Kenyon
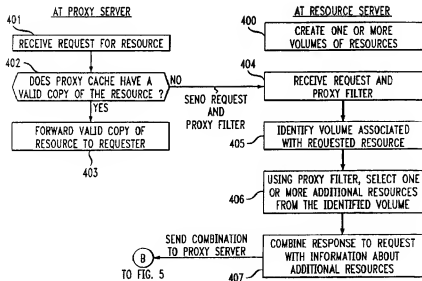
(57)   **ABSTRACT**

A method and apparatus provide improved cache coherency and more effective caching operations without placing an undue burden on network links. A proxy receives a request for a resource and then, depending on information in the proxy cache, generates a resource request for transmission to a resource server. The proxy appends a proxy filter to the request. The resource server maintains one or more volumes of resources based on some predetermined criterion that can be either static or dynamic in nature. Upon receipt of the request and the proxy filter the resource server generates a request response and a piggybacked list of additional resources selected from the volume with which the requested resource is associated.

                  4 Claims, 3 Drawing Sheets

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.M./

(12) **United States Patent**
    Combar et al.

(10) Patent No.: **US 6,470,386 B1**
(45) Date of Patent: **Oct. 22, 2002**

(54) **INTEGRATED PROXY INTERFACE FOR WEB BASED TELECOMMUNICATIONS MANAGEMENT TOOLS**

(75) Inventors: **Curtis T. Combar**, Woodland Park; **Robert A. Pfister**, Colorado Springs, both of CO (US)

(73) Assignee: **WorldCom, Inc.**, Clinton, MS (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/159,516**

(22) Filed: **Sep. 24, 1998**

Related U.S. Application Data

(60) Provisional application No. 60/060,655, filed on Sep. 26, 1997.

(51) Int. Cl.[7] **G06F 15/173**
(52) U.S. Cl. **709/224; 705/40**
(58) Field of Search 709/224, 223, 709/218, 217, 219, 229; 379/112, 201, 265, 114, 140; 713/151, 154; 705/63, 75, 40, 44, 77

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Primary Examiner—Robert B. Harrell
Assistant Examiner—Bunjob Jaroenchonwanit

(57) **ABSTRACT**

A Web/Internet based monitoring system provides a common GUI enabling the requesting and real-time viewing of telecommunication network traffic and statistical data pertaining to a customer's telecommunication network. Such a monitoring system includes: a client browser application located at a client workstation for enabling interactive Web based communications between a customer and the monitoring system; at least one secure server for managing client sessions over the Internet via one or more secure connections; a device for generating statistical data based on real-time call data obtained from a telecommunications network, the statistical data being generated according to a pre-defined user profile; a mechanism for periodically retrieving the statistical data according to the user profile and for integrating the retrieved statistical data within a Web page for presentation to the user over a secure socket connection at pre-defined intervals. The Web page is updated to contain the latest generated statistical data each interval.

17 Claims, 21 Drawing Sheets
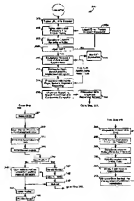
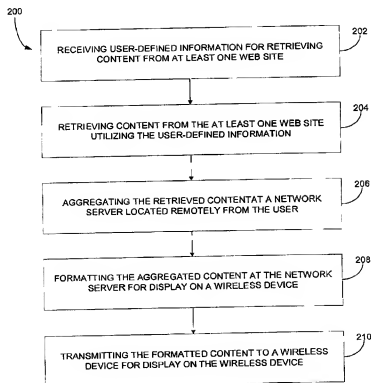ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.M./

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(57) **ABSTRACT**

A system, method and article of manufacture are provided
for selection and formatting of web content for remote
viewing. User-defined information is received and used to
retrieve content from one or more web sites. The retrieved
content is aggregated at a network server located remotely
from the user. The aggregated content is formatted at the
network server for display on a wireless device. The for-
matted content is transmitted to a wireless device for display
on the wireless device.

200

202
RECEIVING USER-DEFINED INFORMATION FOR RETRIEVING
CONTENT FROM AT LEAST ONE WEB SITE

204
RETRIEVING CONTENT FROM THE AT LEAST ONE WEB SITE
UTILIZING THE USER-DEFINED INFORMATION

206
AGGREGATING THE RETRIEVED CONTENT AT A NETWORK
SERVER LOCATED REMOTELY FROM THE USER

208
FORMATTING THE AGGREGATED CONTENT AT THE NETWORK
SERVER FOR DISPLAY ON A WIRELESS DEVICE

210
TRANSMITTING THE FORMATTED CONTENT TO A WIRELESS
DEVICE FOR DISPLAY ON THE WIRELESS DEVICE

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.M./

US006714979B1

(54) **DATA WAREHOUSING INFRASTRUCTURE FOR WEB BASED REPORTING TOOL**

(75) Inventors: **Andre R. Brandt**, Colorado Springs, CO (US); **Barbara Frueh**, Colorado Springs, CO (US); **Sajan J. Pillai**, Colorado Springs, CO (US); **Karl Rehder**, Colorado Springs, CO (US); **Donald J. Shearer**, Colorado Springs, CO (US)

(73) Assignee: **WorldCom, Inc.**, Clinton, MS (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/159,402**

(22) Filed: **Sep. 24, 1998**

Related U.S. Application Data

(60) Provisional application No. 60/060,655, filed on Sep. 26, 1997.

(51) Int. Cl.[7] **G06F 15/173**
(52) U.S. Cl. 709/225; 709/205; 709/217; 709/223; 709/227; 709/229; 707/3; 707/4; 707/9; 707/10
(58) Field of Search 709/205, 225, 709/227, 224, 219, 217, 228, 229, 223; 705/26, 18, 27, 51, 34, 713/155, 201, 152; 707/102, 523, 513, 2, 9, 3, 6, 10; 379/114.01, 114.02, 114.28, 114.29

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4,823,373 A	4/1989	Takahashi et al.	
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4,972,504 A	11/1990	Daniel, Jr. et al.	705/10
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"HP Smart Internet, Transform User Data Into Revenue".*
HP Smart Internet Usage Analysis Solution, Transform User Data Into Competitive Advantage.*
HP/Cisco, Internet Usage Platform, Transforming Internet Services Into Revenue.*

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Primary Examiner—David Wiley
Assistant Examiner—William C. Vaughn, Jr.

(57) **ABSTRACT**

A data warehousing infrastructure for telecommunications priced call detail data is integrated with a Web based reporting system providing a common GUI enabling the requesting, customizing, scheduling and viewing of various types of priced call detail data reports. Such an infrastructure performs an extraction process to obtain only those billing detail records of entitled customers, and a harvesting process for transforming the billing records into a star schema format for storage in one or more operational data storage devices. The system is integrated with a database server supporting expedient and accurate access to the customer's telecommunications priced call detail data for priced call detail data report generation.

37 Claims, 23 Drawing Sheets

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.M./

(12) **United States Patent**

Jilk, Jr. et al.

(10) Patent No.: **US 6,993,559 B2**

(45) Date of Patent: **Jan. 31, 2006**

(54) **SYSTEM, METHOD, APPARATUS AND COMPUTER PROGRAM PRODUCT FOR OPERATING A WEB SITE BY ELECTRONIC MAIL**

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(22) Filed: **Feb. 9, 2001**

(65) **Prior Publication Data**

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G06F 15/16 (2006.01)

(52) **U.S. Cl.** 709/206; 709/217; 709/219; 709/225; 709/246

(58) **Field of Classification Search** 709/206, 709/207, 217, 219, 225, 246
See application file for complete search history.

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(57) **ABSTRACT**

Method, product, and apparatus of operating one or more Web pages by email. One embodiment of the method includes sending a first Web page to a first email address via a computer network as a first email message. The sent first Web page may include one or more of links or forms for further interaction, and is in a format consistent with an email environment such that the Web page is directly operable in an email browser of the environment. A user receiving the first email containing the first Web page may respond by operating the received first Web page, and this response may lead to a second email message that includes a URL request or form data being sent by the user to a second email address via the computer network. The method further includes retrieving the second email message, interpreting the URL request or form data of the retrieved second email message, retrieving a second Web page from a Web server connected to the computer network in accordance with the interpreted URL request or form data, and transcoding the retrieved second Web page from a Web browser format to a third format consistent with one or more properties of a second email environment.

78 Claims, 22 Drawing Sheets
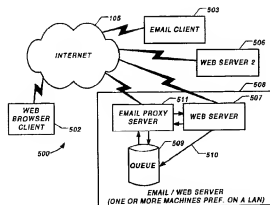
(12) United States Patent
Jungck et al.

(10) Patent No.: **US 7,032,031 B2**
(45) Date of Patent: **Apr. 18, 2006**

(54) **EDGE ADAPTER APPARATUS AND METHOD**

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(21) Appl. No.: 09/858,309

(22) Filed: **May 15, 2001**

(65) **Prior Publication Data**
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Related U.S. Application Data

(63) Continuation-in-part of application No. 09/602,129,
filed on Jun. 23, 2000, now Pat. No. 6,829,654.

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G06F 15/16 (2006.01)
(52) U.S. Cl. 709/246; 709/203
(58) Field of Classification Search 709/246,
709/236, 227, 225, 229, 231, 240, 245, 203;
713/201, 166; 707/6, 10, 101, 104, 9; 715/536;
370/390, 401, 233, 395, 389
See application file for complete search history.

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(57) **ABSTRACT**

An apparatus and method for enhancing the infrastructure of
a network such as the Internet is disclosed. A packet inter-
ceptor/processor apparatus is coupled with the network so as
to be able to intercept and process packets flowing over the
network. Further, the apparatus provides external connec-
tivity to other devices that wish to intercept packets as well.
The apparatus applies one or more rules to the intercepted
packets which execute one or more functions on a dynami-
cally specified portion of the packet and take one or more
actions with the packets. The apparatus is capable of ana-
lyzing any portion of the packet including the header and
payload. Actions include releasing the packet unmodified,
deleting the packet, modifying the packet, logging/storing
information about the packet or forwarding the packet to an
external device for subsequent processing. Further, the rules
may be dynamically modified by the external devices.

108 Claims, 9 Drawing Sheets
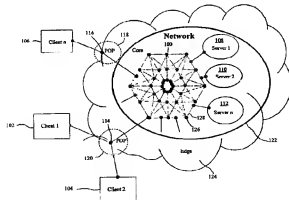
(12) **United States Patent**
Kenner et al.

(10) Patent No.: **US 6,502,125 B1**
(45) Date of Patent: **Dec. 31, 2002**

(54) **SYSTEM AND METHOD FOR OPTIMIZED STORAGE AND RETRIEVAL OF DATA ON A DISTRIBUTED COMPUTER NETWORK**

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(73) Assignee: **Akamai Technologies, Inc.**, Cambridge, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 89 days.

(21) Appl. No.: **09/635,289**

(22) Filed: **Aug. 9, 2000**

Related U.S. Application Data

(63) Continuation of application No. 09/213,946, filed on Dec. 17, 1998, now Pat. No. 6,154,744, which is a continuation of application No. 08/733,516, filed on Oct. 18, 1996, now Pat. No. 6,003,030, which is a continuation-in-part of application No. 08/660,540, filed on Jun. 7, 1996, now Pat. No. 5,956,716, which is a continuation-in-part of application No. 08/486,517, filed on Jun. 7, 1995, now Pat. No. 6,181,867.

(51) Int. Cl.[7] G06F 17/30
(52) U.S. Cl. 709/203; 709/224
(58) Field of Search 709/217, 203, 709/219, 223, 224, 226; 707/10

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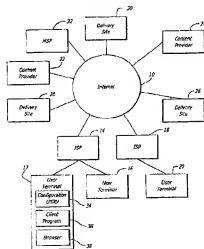
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(57) **ABSTRACT**

A system and method for the optimized storage and retrieval of video data at distributed sites calls for the deployment of "Smart Mirror" sites throughout a network, each of which maintains a copy of certain data managed by the system. Every user is assigned to a specific delivery site based on an analysis of network performance with respect to each of the available delivery sites. Generalized network performance data is collected and stored to facilitate the selection of additional delivery sites and to ensure the deployment of improved performance in comparison to traditional networks.

10 Claims, 3 Drawing Sheets